

What is claimed is:

1. A method of preparing patterned colloidal crystals, the method comprising:

5 filling a monomer solution into interstices of colloidal crystals for photopolymerization inside them; and
 performing a selective photopolymerization process in the interstices of colloidal crystals by use of a mask.

10 2. The method as defined in claim 1, wherein the monomer solution for the photopolymerization comprises an acrylate monomer.

 3. The method as defined in claim 2, wherein the
15 acrylate monomer is selected from the group consisting of hydroxypropyl methacrylate, hydroxyethyl methacrylate, methacrylate, or mixtures thereof.

 4. The method as defined in claim 1, wherein the
20 colloidal crystals each comprise at least one selected from the group consisting of polystyrene, polymethyl methacrylate, polyphenyl methacrylate, polyacrylate, polyalpha-methylstyrene, poly1-methylcyclohexyl methacrylate, polycyclohexyl methacrylate, polybenzyl methacrylate,
25 polychlorobenzyl methacrylate, poly1-phenylcyclohexyl

methacrylate, poly1-phenylethyl methacrylate, polyperfuryl
methacrylate, poly1,2-diphenylethyl methacrylate,
polypentabromophenyl methacrylate, polydiphenylmethyl
methacrylate, polypentachlorophenyl methacrylate, copolymer
5 of methyl methacrylate and benzyl methacrylate, copolymer of
styrene and acrylonitrile, copolymer of methyl methacrylate
and 2,2,2-trifluoroethyl methacrylate, copolymer of methyl
methacrylate and 2,2,3,3,3-pentafluoropropyl methacrylate,
copolymer of methyl methacrylate and 1,1,1,3,3,3-
10 hexafluoroisomethacrylate, copolymer of methyl methacrylate
and 2,2,3,3,4,4,4-heptafluorobutyl methacrylate, copolymer
of 2,2,2-trifluoroethyl methacrylate and 2,2,3,3,3-
pentafluoropropyl methacrylate, copolymer of 2,2,2-
trifluoroethyl methacrylate and 1,1,1,3,3,3-
15 hexafluoroisomethacrylate, copolymer of styrene and methyl
methacrylate, and copolymer of 2,2,2-trifluoroethyl
methacrylate and 2,2,3,3,4,4,4-heptafluorobutyl methacrylate.

5. The method as defined in claim 1, wherein the
20 colloidal crystals each comprise at least one selected from
the group consisting of SiO_2 , TiO_2 , ZnS , ZnO_2 , and Fe_3O_4 .

6. The method as defined in claim 1, wherein light for
use in the polymerization is selected between ultraviolet
25 ranges and visible ranges.

7. A method of preparing patterned colloidal crystals,
the method comprising:

filling a first monomer solution for
5 photopolymerization between planar colloidal crystals;

performing a first selective photopolymerization
process between the colloidal crystals by use of a mask, to
prepare firstly patterned colloidal crystals; and

filling a second monomer solution for
10 photopolymerization between the firstly patterned colloidal
crystals, followed by performing at least one
photopolymerization process between the firstly patterned
colloidal crystals by use of an additional mask.

15 8. The method as defined in claim 7, wherein the first
monomer solution or the second monomer solution for the
photopolymerization comprises an acrylate monomer.

9. The method as defined in claim 8, wherein the
20 acrylate monomer is selected from the group consisting of
hydroxypropyl methacrylate, hydroxyethyl methacrylate,
methacrylate, or mixtures thereof.

10. The method as defined in claim 7, wherein the
25 colloidal crystals each comprise at least one selected from

the group consisting of polystyrene, polymethyl methacrylate, polyphenyl methacrylate, polyacrylate, polyalphamethylstyrene, poly1-methylcyclohexyl methacrylate, polycyclohexyl methacrylate, polybenzyl methacrylate, 5 polychlorobenzyl methacrylate, poly1-phenylcyclohexyl methacrylate, poly1-phenylethyl methacrylate, polyperfuryl methacrylate, poly1,2-diphenylethyl methacrylate, polypentabromophenyl methacrylate, polydiphenylmethyl methacrylate, polypentachlorophenyl methacrylate, copolymer 10 of methyl methacrylate and benzyl methacrylate, copolymer of styrene and acrylonitrile, copolymer of methyl methacrylate and 2,2,2-trifluoroethyl methacrylate, copolymer of methyl methacrylate and 2,2,3,3,3-pentafluoropropyl methacrylate, copolymer of methyl methacrylate and 1,1,1,3,3,3- 15 hexafluoroisomethacrylate, copolymer of methyl methacrylate and 2,2,3,3,4,4,4-heptafluorobutyl methacrylate, copolymer of 2,2,2-trifluoroethyl methacrylate and 2,2,3,3,3-pentafluoropropyl methacrylate, copolymer of 2,2,2-trifluoroethyl methacrylate and 1,1,1,3,3,3- 20 hexafluoroisomethacrylate, copolymer of styrene and methyl methacrylate, and copolymer of 2,2,2-trifluoroethyl methacrylate and 2,2,3,3,4,4,4-heptafluorobutyl methacrylate.

11. The method as defined in claim 7, wherein the 25 colloidal crystals each comprise at least one selected from

the group consisting of SiO_2 , TiO_2 , ZnS , ZnO_2 , and Fe_3O_4 .

12. The method as defined in claim 7, wherein light
for use in the polymerization is selected between
5 ultraviolet ranges and visible ranges.